

No. 8 — *An Annotated Checklist And Key To  
The Anoline Lizards of Cuba*

BY

RODOLFO RUIBAL

Division of Life Sciences  
University of California  
Riverside

CONTENTS

	<i>Page</i>
Introduction .....	476
Common names .....	479
Distribution .....	479
Account of the species .....	481
<i>Chamaecolis chamaeleonides</i> .....	481
<i>Anolis equestris</i> .....	482
<i>porcatus</i> .....	484
<i>allisoni</i> .....	486
<i>isolepis</i> .....	487
<i>angusticeps</i> .....	488
<i>ophiolepis</i> .....	489
<i>sagrei</i> .....	490
<i>homolechis</i> .....	495
<i>mestrei</i> .....	497
<i>allogus</i> .....	497
<i>ahli</i> .....	498
<i>rubribarbus</i> .....	499
<i>imias</i> .....	499
<i>lucius</i> .....	500
<i>argentcolus</i> .....	502
<i>loysiana</i> .....	503
<i>argillaceus</i> .....	504
<i>alutaceus</i> .....	505
<i>spectrum</i> .....	507
<i>cyanopleurus</i> .....	510
<i>vermiculatus</i> .....	511
<i>bartschi</i> .....	512
Key to the Cuban species of anoline lizards .....	513
Acknowledgments .....	516
Literature cited .....	516

## INTRODUCTION

In two recent publications (Ruibal and Williams, 1961a, b) the systematics of eight of the Cuban species of the iguanid lizard genus *Anolis* were reviewed in detail. These papers represent the first thorough revision of any of the Cuban anoles since Barbour and Ramsden's "Herpetology of Cuba" published in 1919. The present paper is an attempt to bring up to date our knowledge of the other species of Cuban anoles. In this article no detailed presentation of the morphology and variation of the species will be attempted, but rather a listing of the species with a practical morphological definition, a summary of the distribution, and some indication of the ecology of the various forms. Since Barbour and Ramsden's publication, only three valid new species of Cuban *Anolis* have been described. There has, nevertheless, always existed a certain taxonomic vagueness and biological ignorance about many of the Cuban anoline lizards. This is due in part to Barbour's careless taxonomy and in part to the relatively little herpetological collecting that was done in Cuba until very recently.

A total of twenty-two species of *Anolis* and the monotypic genus *Chamaeleolis* are considered in this checklist. This constitutes the total number of species of anoline lizards on the island and includes the forms previously referred to the genera *Dicroptyx* and *Norops*. Etheridge (1959, unpublished Ph.D. thesis) has reviewed the osteology of *Anolis* and related genera, and has concluded that neither the two species of *Dicroptyx* nor *Norops ophiolepis* merit recognition in separate genera. According to Etheridge, however, the genus *Chamaeleolis*, though related to *Anolis*, appears to be the most distinctive of the anoline genera. Consequently, I follow him in regarding *C. chamaeleoides* as representative of a monotypic genus.

In the checklist that follows, complete synonymies have not been provided. After each species the following is cited: the original description giving the name in the original form, the allocation to the genus *Anolis* (if not placed in that genus originally), Barbour and Ramsden's classification in 1919 and Barbour's in 1937, and any other nomenclatural changes (including the use of trinomials) since 1914. The original type locality is then cited. In some of the cases where no specific type locality was given in the original description, I have restricted the type locality to what appears to be a reasonable site.

A short morphological definition of each species is provided. This contains a description of the color of the animals while alive as well as the more distinctive characters of scalation. In the anoline lizards color and pattern are often a more precise and convenient method of identifying and distinguishing the various species than scalation.

The known distribution of each species is indicated and also the range of any recognized subspecies. The data for the distribution were obtained from specimens in the Museum of Comparative Zoology as well as the American Museum of Natural History, United States National Museum, and University of Michigan Museum of Zoology. Literature citations have also been utilized where I felt that data were reliable or consistent with the museum locality data.

Below are listed the species recognized and the groups that they form. Some species are not included in any group but are placed near the forms that they resemble morphologically.

Genus *Chamaeleolis**C. chamaeleonides*Genus *Anolis**A. equestris**A. porcatus**A. allisoni**A. angusticeps**A. isolepis**carolinensis* group, *sensu lato**A. ophiolepis**A. sagrei**A. homolechis**A. mestrei**A. allogus**A. ahli**A. rubribarbus**A. imias**homolechis-sagrei* group*A. lucius**A. argenteolus**A. loysiana**A. argillaceus**lucius* group*A. alutaceus**A. spectrum**A. cyanopleurus**alutaceus* group*A. vermiculatus**A. bartschi**vermiculatus* group

The treatment of each species ends with a brief discussion of its ecology under the heading "remarks." Of the twenty-three species included in the checklist, I have observed all but four alive in the field. The species not seen in nature are: *A. bartschi*, *A. vermiculatus*, *A. imias*, and *A. cyanopleurus*.

A key to all twenty-three species is provided. It should be possible with the key and the aid of the additional morphological definitions presented in the text to identify both sexes of all the species. However, the key and descriptions are based primarily on the structure of the adult males; juveniles, as well as female specimens, usually do not demonstrate the diagnostic characters of the species as clearly as the adult males. An attempt has been made to make the key as nearly "natural" as possible and, consequently, the species I believe to be most closely related will key out near each other. In the checklist the related species have also been grouped. However, the sequence of the species in the list or key is not indicative of any supposed relationship.

The species groups are not to be considered definitive. They are based exclusively on the degree of similarity in the external morphology. Consequently, in certain cases, forms that are merely evolutionarily convergent have probably been classed as closely related. The morphological characteristics of these groups are as follows:

*carolinensis* group, *sensu lato*

Tail round in cross section and the ventrals in transverse rows. Head scales keeled. With the exception of *A. angusticeps* all the species have five scales bordering the rostral posteriorly and have green color phases. All are relatively long-snouted forms.

*homolechis-sagrei* group

Tail laterally compressed and the ventrals not in transverse rows. Head scales keeled. The supraorbital semicircles are usually not in contact medially. The body scales are small, the head is short snouted, and no green color phase occurs.

*lucius* group

The supraorbital semicircles are in broad contact medially. The head scales as well as the ventrals are smooth.

*alutaceus* group

A wide middorsal zone of enlarged keeled scales. Body and limbs elongate.

*vermiculatus* group

A transverse gular fold, no dewlap present.

## COMMON NAMES

The majority of the Cuban species of *Anolis* have no specific common name other than "lagartija" or "lagartijo." This is the name that most Cubans will use when referring to *A. homolechis* or *A. sagrei*, or actually any relatively small lizard. Below are tabulated the names that I have personally heard used or names cited by Barbour and Ramsden (1919) or by Alayo (1955). There is considerable variation between the names used in Oriente and the western end of the island. The same common name may be used for different species in different parts of the island.

caguayo	<i>A. allisoni</i> (Camaguey); <i>A. equestris</i> (Oriente)
caguayo gris	<i>C. chamaeleonides</i> (Oriente)
caguayo verde	<i>A. equestris</i> (Oriente)
caiman	<i>A. vermiculatus</i>
camaleon	<i>A. equestris</i> (western Cuba); <i>C. chamaeleonides</i> (Oriente)
chino	<i>A. sagrei</i> (Habana)
chipojo	<i>A. equestris</i> (Camaguey); <i>A. porcatius</i> (Oriente); <i>C. chamaeleonides</i>
chipojo blanco	<i>C. chamaeleonides</i> (Oriente)
chipojo prieto	<i>C. chamaeleonides</i>
chipojo verde	<i>A. equestris</i> (Oriente)
coronel	<i>A. lucius</i> (Matanzas)
lagartija (o)	<i>A. sagrei</i> ; <i>A. homolechis</i> ; <i>A. allogus</i> , etc.
lagartija de la yerba	<i>A. ophiolepis</i>
lagartija de tablado	<i>A. argenteocolus</i> (Oriente)
lagarto	<i>A. allisoni</i> (Camaguey); <i>A. porcatius</i>
sabandija	<i>A. lucius</i> (Las Villas)

## DISTRIBUTION

In Table 1 the distribution of the twenty-three species of Cuban anoline lizards is tabulated. It is evident that all six provinces of the island have a relatively large number of species. Oriente at the extreme eastern end of Cuba has the most varied fauna with 18 of the 23 species represented. Eleven of the

species are islandwide in distribution (*sagrei*, *homolechis*, *allogus*, *angusticeps*, *porcatus*, *equestris*, *alutaceus*, *lucius*, *loysiana*, *ophiolepis* and *C. chamaeleonides*). All of the species that are found on Isla de Pinos are islandwide on Cuba. The Isla de Pinos anoline fauna can thus be assumed to be recently derived from Cuba.

TABLE 1  
Distribution of anoline species in Cuba

Species	Pinar del Rio	Habana	Matanzas	Las Villas	Camaguey	Oriente	Isla de Pinos
<i>C. chamaeleonides</i>	X	X	X	X	X	X	
<i>A. equestris</i>	X	X	X	X	X	X	X
<i>A. porcatus</i>	X	X	X	X	X	X	X
<i>A. allisoni</i>				X	X	X	
<i>A. angusticeps</i>	X	X	X	X	X	X	X
<i>A. isolepis</i>					X	X	
<i>A. sagrei</i>	X	X	X	X	X	X	X
<i>A. ophiolepis</i>	X	X	X	X	X	X	X
<i>A. homolechis</i>	X	X	X	X	X	X	X
<i>A. allogus</i>	X	X	X?	X?	X	X	
<i>A. mestrei</i>	X						
<i>A. ahli</i>				X			
<i>A. rubribarbus</i>						X	
<i>A. imias</i>						X	
<i>A. loysiana</i>	X	X	X	X	X	X	
<i>A. argillaceus</i>		X			X	X	
<i>A. lucius</i>	X	X	X	X	X	X	
<i>A. argenteolus</i>					X	X	
<i>A. alutaceus</i>	X	X	X	X	X	X	X
<i>A. spectrum</i>			X	X			
<i>A. cyanopleurus</i>			?			X	
<i>A. vermiculatus</i>	X						
<i>A. bartschi</i>	X						
Total number of species	14	12	12	14	15	18	7

Within Cuba, the greatest differentiation occurs between the eastern and western ends of the island. Five species are apparently restricted to eastern Cuba (*rubribarbus*, *imias*, *argentocolus*, *isolepis*, and *cyanopleurus*) and three are peculiar to western Cuba (*bartschi*, *vermiculatus* and *mestrei*). A further center of differentiation occurs in central Cuba in the Sierra de Trinidad to which *ahli* and *spectrum* are restricted. The three areas of differentiation on Cuba are mountainous and each of the areas is isolated from the others by broad regions of flat lowlands. *A. allisoni* has a unique distribution in comparison to all the other Cuban species—it is found in the lowlands of central and eastern Cuba and is limited in Oriente to the flat western portion of the province.

## ACCOUNT OF THE SPECIES

### CHAMAELEOLIS CHAMAELEONIDES Duméril and Bibron

*Anolis chamaeleonides* Duméril and Bibron, 1837, p. 168.

*Chamaeleolis fernandina* Cocteau, 1838, p. 145.

*Chamaeleolis chamaeleontides*: Barbour, 1914, p. 271; Barbour and Ramsden, 1919, p. 128.

*Chamaeleolis chamaeleonides*: Barbour, 1937, p. 117.

*Type locality.* Cuba.

*Definition.* The dorsum is covered with irregularly dispersed large and small scales. The scales are flat and smooth and the larger scales are circular. There is a middorsal crest composed of a single row of small triangular scales. Head scales are rugose: a very large massive bony head casque overlaps the neck. In the older specimens the orbit is roofed with bone. Two rows of enlarged triangular scales extend from the mental to the anterior border of the dewlap (Fig. 1). There is a small fleshy

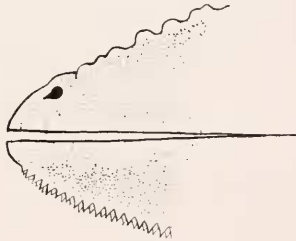


Figure 1. Snout of *C. chamaeleonides* showing the double row of triangular chin scales.

flap above the ear opening. Tail and body are laterally compressed.

The body color is usually grey with streaks and spots of black, brown-tan, and/or dark red. The animal can shift to a dark phase which is brown. The tongue is white and has a black tip. Juveniles lack the head casque but have the same body color as the adults.

There is no sexual dimorphism. Both sexes have a large grey or whitish dewlap; maximum snout to vent length 155 mm.

*Distribution.* This species is islandwide in its distribution. It has not been reported from Isla de Pinos.

*Remarks.* It appears that *C. chamaeleonides* is restricted to broadleaf forests and to the shaded portions of the forest. In Oriente it is reputedly common in the coffee groves—these are shaded coffee plantings that grow beneath the canopy of larger trees. Gundlach (1880) observed that it was restricted to forests, and that it was easy to capture. This is true, and its general behavior is chamaeleon-like in its slowness as well as in its ability to move each eye independently. Wilson (1957) has provided a short description of the behavior of a captive specimen. I have caught five of these animals in the forests of Camaguey and Oriente and in every case the lizard failed to make any attempt to escape. The animals are often perched head downward on large tree trunks in the same manner as the small species of *Anolis*.

#### ANOLIS EQUESTRIS Merrem

*Anolis equestris* Merrem, 1820, p. 45.

*Anolis equestris*: Barbour and Ramsden, 1919, p. 133.

*Anolis equestris equestris*: Barbour and Shreve, 1935, p. 249.

*Anolis luteocularis* Noble and Hassler, 1935, p. 113.

*Anolis equestris luteocularis*: Barbour and Shreve, 1935, p. 249.

*Anolis equestris luteosignifer* Barbour, 1937, p. 118, in error.

*Anolis equestris noblei* Barbour and Shreve, 1935, p. 250; Barbour, 1937, p. 118.

*Anolis equestris hassleri* Barbour and Shreve, 1935, p. 251; Barbour, 1937, p. 118.

*Anolis equestris thomasi* Schwartz, 1958, p. 3.

*Type locality.* Unknown.

*Definition.* A middorsal crest of small triangular scales; head scales rugose; body and tail laterally compressed. The caudal crest is thick and bony and there is also a bony nuchal crest and



postorbital ridge. There is considerable geographic variation in the size and shape of the scales of the body.

In the light phase the general body color is bright green, and dark brown in the dark phase. The various described subspecies differ in respect to the color pattern of the adults (see Schwartz, 1958). The dewlap varies from yellow or pale orange in Pinar del Rio (*A. equestris lutcogularis*) to pink in Oriente (*A. e. noblei*). There is a postorbital light blotch, a labial stripe and a shoulder stripe. These also show geographic variation in coloration and extent.

As has been observed by Barbour and Ramsden (1919) and Alayo (1955), the color pattern of the juveniles is very different from that of the adults. The body of the young specimens of *A. equestris* is marked by four prominent white stripes crossing the body diagonally. There are also prominent white diamonds on the dorsum of the tail.

There is no sexual dimorphism in size or markings. The males and females have large dewlaps; maximum snout to vent length, ♂, 157 mm.

*Distribution.* The species is found throughout the island and on Isla de Pinos. The distribution of the various subspecies, as mapped by Schwartz (1958), is: *A. e. lutcogularis* from Pinar del Rio to Habana; *A. e. equestris* in Habana, Matanzas, Las Villas and western Camaguey; *A. e. thomasi* Camaguey and northwestern Oriente; *A. e. noblei* eastern Oriente; and *A. e. hassleri* on Isla de Pinos.

*Remarks.* This is the largest of the Cuban anoles, and it is a relatively common and well known species. The giant anole, or "chipojo," is found in agricultural areas, around houses, in gardens, as well as in the forests. It is an aggressive lizard, wary, and difficult to capture. When caught, it is capable of inflicting a painful bite. Many of the Cuban "guajiros" ascribe a poisonous property to the bite of *A. equestris* — this is apparently an old belief since Gundlach (1880) cites this same folklore.

The diet of this species is apparently very varied. It has been observed to eat fruit, tree frogs and insects (Barbour and Ramsden, 1919; Gundlach, 1880). In Camaguey, it has been reportedly observed to feed on birds — nestlings and caged birds. I have observed a half-grown *A. equestris* repeatedly attacked by a "zorzal" (*Minocichla plumbea*) while the lizard slowly backed away along a branch twenty feet from the ground. When threatened, the "chipojo" turns laterally to its attacker and opens its

large and cavernous mouth hissing and slowly maneuvering for position.

It lives high in the trees — it is rarely seen less than ten feet from the ground. It sometimes perches head downward on the trunk. The “chipojos” are quick to “freeze” on the approach of man and, consequently, are difficult to observe among the leaves of a tree. They will often slowly circle around a trunk, squirrel-like, keeping just out of sight.

### ANOLIS PORCATUS Gray

*Anolis porcatus* Gray, 1840, p. 112.

*Anolis porcatus porcatus*: Barbour, 1937, p. 119.

*Anolis carolinensis porcatus*: Oliver, 1948, p. 7.

*Anolis porcatus*: Ruibal and Williams, 1961a, p. 184.

*Type locality.* Cuba.

*Definition.* A long-snouted lizard having the nostril separated from the rostral by three scales. The rostral is bordered posteriorly by five scales (Fig. 2). The ventrals at midbody are in transverse and diagonal rows; ventrals and dorsals slightly keeled; the frontal ridge higher than the canthal ridge in most males. The ear opening is circular, or in some specimens from Pinar del Rio the posterior margin of the ear opening is V-shaped. Body color capable of changing from dark brown to bright green. The color pattern of the body differs between eastern, central, and western populations (see Ruibal and Williams, 1961a). Dewlap reddish or mauve. Females smaller than males and without a dewlap. Maximum snout to vent length, ♂, 73 mm.

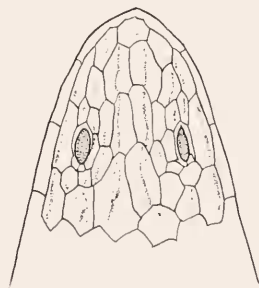


Figure 2. Dorsal view of the tip of the snout of a specimen of *A. porcatus*. The *carolinensis* group characters are shown: five scales bordering the rostral posteriorly and three scales between the rostral and nostril.

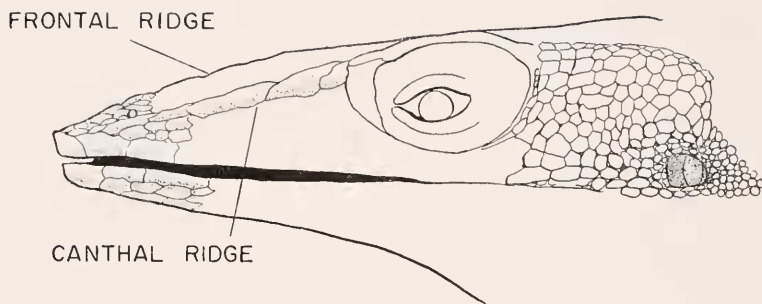


Figure 3. Head of a male *A. porcatus*. The circular ear opening, the high frontal ridges, and the large postorbital scales are shown.

*Distribution.* This species has an island-wide distribution and is also found on Isla de Pinos. Shaw and Breese (1951) have reported "*A. carolinensis porcatus*" from Honolulu, in the Hawaiian Islands. I have examined some of the specimens on which this report is based. They are males larger than the usual *A. carolinensis* from the southeastern United States. They may represent specimens of *A. porcatus* originally from the area of Habana or *A. carolinensis* from the United States. In any case, their body pattern indicates that the Hawaiian population is not originally derived from Pinar del Rio, central Cuba or eastern Cuba.

The geographic variation of *porcatus* is complex and is discussed in Ruibal and Williams (1961a). *A. porcatus*, as it is recognized, may represent more than one species. With this in mind I have refrained from using the trinomial *A. carolinensis porcatus*. Undoubtedly *A. carolinensis* is closely related to *porcatus*; however, the proper nomenclature will only be clear after the Cuban populations of *porcatus* are better understood.

*Remarks.* At the western and eastern ends of Cuba, *porcatus* is a very common species found around houses, in gardens, on fences, pastures, and at the outermost edges of the forest. In the provinces of Camaguey and Las Villas (and western Oriente) *porcatus* is sympatric with *A. allisoni* and in these areas it is a relatively rare species.

Collette (1961) has recently provided a detailed study of some aspects of the ecology of *porcatus*. He reports the interesting phenomenon that in Habana during December, specimens of

*porcatus* congregate (up to 30 individuals) under palm fronds and exhibit no territoriality.

#### ANOLIS ALLISONI Barbour

*Anolis allisoni* Barbour, 1928, p. 58; Ruibal and Williams, 1961a, p. 183.

*Type locality.* Coxen Hole, Ruatan, Islas de la Bahia, off the north coast of Honduras.

*Definition.* Similar to *A. porcatus*. However, it differs from that species in having an elongate ear opening, the posterior margin forming a longitudinal depression (Fig. 4). The temporal or postocular scales are smaller than in *A. porcatus*. In males the canthal ridges are higher than the frontal ridges. Males have the head and thorax blue when in the light color phase. Females are all green and show no blue color. Both sexes can change to dark brown. The dewlap is reddish or mauve. Females smaller than males, without a dewlap, and with a light middorsal stripe. Maximum snout to vent length, ♂, 75 mm.

CANTHAL RIDGE

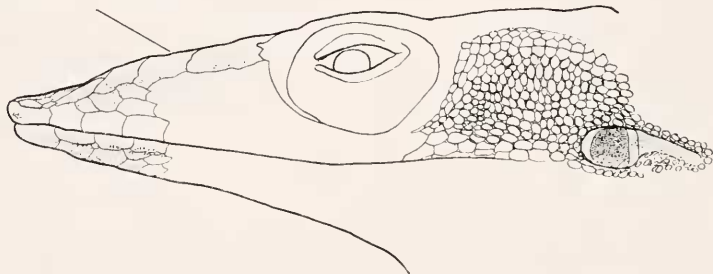


Figure 4. Head of a male *A. allisoni*. The elongate ear opening is shown.

*Distribution.* Though originally described from the Islas de la Bahia, this is a common species in central Cuba (Las Villas, Camaguey, and western lowland Oriente) and was until recently (Ruibal and Williams, 1961a) confused with and identified as *A. porcatus*. In central Cuba *allisoni* and *porcatus* are sympatric and appear to occupy overlapping ecological niches. Where the two species are sympatric, *allisoni* is always the more abundant species.

Besides being found on Islas de la Bahia, *A. allisoni* has also been collected on Half Moon Cay off the coast of British Honduras.

*Remarks.* In central Cuba *allisoni* is a very common lizard in the vicinity of human dwellings, in gardens, fence posts, etc. In Camaguey it is very common on the coconut palm and on the royal palm (*Roystonea*). See Ruibal (1961) for further ecological data.

#### ANOLIS ISOLEPIS COPE

*Anolis isolepis* Cope, 1861, p. 214; Barbour and Ramsden, 1919; Barbour, 1937, p. 128.

*Type locality.* Cafetal Monte Verde, Sierra de Yateras, east of the Bahia de Guantanamo, Oriente.

*Definition.* Dorsal surface of head flat; no frontal ridges or depression; head scales large, with wavy longitudinal striations (Fig. 5), flat and generally hexagonal in shape. Single row separating the circumorbital semicircles; five scales bordering the rostral posteriorly; dorsals small, nonimbricate, and may be keeled; the ventrals keeled or smooth and in transverse and diagonal rows; body laterally compressed; tail shows slight lateral compression.

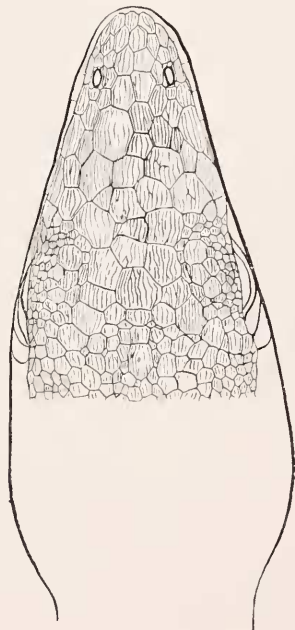


Figure 5. Head scales of *A. isolepis*.

The general body color is bright green. This may change to a purplish shade and dark reticular markings may become evident. Apparently both sexes have a dewlap. The color of the dewlap is apricot yellow, though a female from Camaguey had a yellowish-white dewlap. Males have a thin white line from below the eye to above the forelimb; maximum snout to vent length, ♂, 40 mm.

*Distribution.* Found only in Oriente and Camaguey.

*Remarks.* This is probably the rarest of the Cuban anoles. It is a vocal lizard and emits high-pitched squeaks on being captured. Its ability to assume a purple color, its flat head scales, and vocal ability make it one of the most distinctive of the Cuban anoles. It is an aggressive lizard and will bite repeatedly on being captured. This, combined with its relatively large head, laterally compressed body, and green color, cause it to resemble a lilliputian *A. equestris*. This species is restricted to the deep, broadleaf forests of eastern Cuba. The two specimens that I have collected were both obtained at a height of about eight feet in the leaves of the lowest canopy in the forest.

#### ANOLIS ANGUSTICEPS Hallowell

*Anolis angusticeps* Hallowell, 1856, p. 228; Barbour and Ramsden, 1919, p. 135.

*Anolis angusticeps angusticeps*: Barbour, 1937, p. 128; Oliver, 1948, p. 2.

*Anolis angusticeps oligaspis*: Barbour, 1937, p. 128; Oliver, 1948, p. 2.

*Anolis angusticeps chickcharneyi* Oliver, 1948, p. 2.

*Type locality.* Cienfuegos, Las Villas.

*Definition.* Head scales rugose or striated in males, usually smooth in females; circumorbital semicircles separated by a single row of scales; frontal ridges on the males; usually only two supraoculars. Dorsals and laterals granular, equal in size and smooth; ventrals smooth and in transverse and diagonal rows. Tail round in cross section. Body with slight dorsoventral compression.

General body color can change from greyish to yellowish brown to dark brown. The body pattern is variable and usually shows some longitudinal markings. In the dark phase the body pattern may be obliterated. Ventral surface usually with much yellow pigment and scattered dark markings. The tail may show a cross-banded effect when viewed from above. Three yellow or light spots usually present on the posterior surface of the femoral region. Dewlap peach (yellow-pink) in color. Maximum snout to vent length, ♂, 49.5 mm.

*Distribution.* Islandwide and on Isla de Pinos. Also in the Bahamas (*A. angusticeps oligaspis*). (*A. angusticeps chick-charncyi*).

*Remarks.* The characters of scalation distinguishing the subspecies are described by Oliver (1948).

This species is found throughout the island, but it is in most areas a rarely seen form. I have only observed it to be common on small bushes and tree trunks in the pine savanna of the southern coastal plain of Pinar del Rio near Herradura. It is apparently a heliothermic species characteristically found in open habitats: fence posts, rocks, palm trunks, and on *Coccoloba* along the coast (Alayo, 1955). However, Collette (1961) describes it from a forest habitat in Habana.

Barbour (1914) mistakenly described specimens of *allogus* as this species. He corrected this in 1919 in the "Herpetology of Cuba."

#### ANOLIS OPHIOLEPIS Cope

*Anolis (Dracontura) ophiolepis* Cope, 1861, p. 211.

*Norops ophiolepis*: Boulenger, 1885, p. 96; Barbour, 1914, p. 296; Barbour and Ramsden, 1919, p. 164; Barbour, 1937, p. 131.

*Type locality.* Cafetal Monte Verde, Sierra de Yateras, east of the Bahia de Guantanamo, Oriente.

*Definition.* Head scales longer than wide and each with a single keel; canthus rostralis made up of two scales, the anterior-most scale much the longer; a single suborbital scale; middorsal zone of enlarged, imbricate, lanceolate, keeled scales; lateral scales much smaller but keeled and imbricate; ventrals keeled, pointed, and imbricate and in longitudinal and diagonal rows; limbs with keeled and imbricate scales; tail laterally compressed.

The body color is brown with five longitudinal stripes—a middorsal, two paravertebrals, and two laterals. There is a very small pink to red dewlap that is covered with large keeled scales. Some males have been observed with bluish coloration on the lateral surfaces. Maximum size, ♂, 35 mm.

*Distribution.* Islandwide and on Isla de Pinos.

*Remarks.* This is not a rare species; it is merely rarely caught. This is the only truly terrestrial species of the Cuban anoline lizards. This species is found in the pastures and savannas, on the ground, and runs to take refuge in the grass tussocks. I have observed this species at night sleeping on the blades of grass or on the leaves of small bushes.

Contrary to the statement of Barbour (1914, p. 296), this species does possess subdigital lamellae like that of the other species of *Anolis*. The lamellae are fewer in number and relatively narrow.

#### ANOLIS SAGREI Duméril and Bibron

*Anolis sagrei* Duméril and Bibron, 1837; Barbour and Ramsden, 1919, p. 143.

*Anolis greyi* Barbour, 1914, p. 287; Barbour and Ramsden, 1919, p. 144; Barbour, 1937, p. 128.

*Anolis bremeri* Barbour, 1914, p. 288; Barbour and Ramsden, 1919; Barbour, 1937, p. 129.

*Anolis nelsoni* Barbour, 1914, p. 287.

*Anolis stejnegeri* Barbour, 1931, p. 88.

*Anolis sagrei sagrei*: Barbour, 1937, p. 126; Oliver, 1948, p. 23.

*Anolis sagrei ordinatus*: Barbour, 1937, p. 126; Oliver, 1948, p. 23.

*Anolis sagrei stejnegeri*: Oliver, 1948, p. 23; Duellman and Schwartz, 1958, p. 281.

*Anolis sagrei mayensis*: Smith and Burger, 1949, p. 407.

*Type locality.* Cuba. It appears reasonable to restrict the type locality to the city of La Habana, Habana.

*Definition.* In scalation *sagrei* is very similar to *homolcchis*. All of the body and head scales are keeled. There is a middorsal zone about six scales wide of slightly enlarged keeled scales, most of which are imbricate. In the other species of the *homolcchis* group the middorsal zone of enlarged scales is only about two scales wide, the scales are feebly keeled, and not imbricate. Lateral scales small and granular but showing evidence of keels. Ventrals keeled, imbricate, pointed and in longitudinal and diagonal rows. Supradigital scales multicarinate. Tail laterally compressed and with evidence of a caudal crest in some specimens.

Body color and pattern variable. The general ground color is tan, brown, or very dark brown. The middorsal zone is usually darker than the rest of the body. In some animals the top of the head and top of the neck are reddish brown and the body tan when in the light phase. In the dark phase, yellow vertical stripes and dots are present on the flanks. Dewlap color variable (see below). Maximum body size for Cuban ♂♂, 67 mm. Most adult males are less than 60 mm. (see below).

*Distribution.* Islandwide and on Isla de Pinos. *A. sagrei* is widely distributed outside of Cuba (Fig. 6): Bahamas (*A. sagrei ordinatus*), Florida (*A. sagrei stejnegeri*), Yucatan, Campeche, British Honduras (*A. sagrei mayensis*), Little Cayman, Jamaica (*A. sagrei sagrei*), and Swan Island (*A. sagrei nelsoni*).





Figure 6. Map of the distribution of *Anolis sagrei* and its close relatives.

*Remarks.* In 1914 Barbour described *Anolis greyi* from Camaguey as related to *sagrei*. I have examined the type in the Museum of Comparative Zoology and many *sagrei* collected in the vicinity of the city of Camaguey — the type locality of *greyi*. I have found no evidence for considering *greyi* a distinct form and have consequently placed it in the synonymy of *sagrei*.

Barbour also described *Anolis bremeri* from Pinar del Rio as a new species in 1914. This form is readily distinguishable from

the "typical" *sagrei*, and furthermore is restricted to the southern coastal plains region of Pinar del Rio. Schwartz (1959) has demonstrated that this area of Cuba has a number of species that are distinct from those on the rest of the island. *A. bremeri* is characterized by having a large and deeply pigmented dewlap. Initially the dewlap appears brownish in color but on closer inspection it is seen to be a deep ochraceous yellow with large deep red (maroon) markings. The margin of the dewlap is the same color as the main portion of the dewlap, and the scales along the margin, as well as on the dewlap itself, are very deeply pigmented with melanin. When the dewlap is folded it appears as a black mark on the throat. The maximum snout to vent length of this lizard is greater than that of most Cuban populations of *sagrei* (see below). This form is morphologically distinct and further study is necessary to determine whether it should be treated as a subspecies or full species.

In 1931 Barbour described another new species, *stejnegeri*, from Key West, Florida, and claimed that it was related to *ahli* and *mestrei* of Cuba. However, Smith (1946), Oliver (1948), and Duellman and Schwartz (1958) have shown that *stejnegeri* is closely related to the Cuban populations of *sagrei* and have indicated this by using the trinomial *A. sagrei stejnegeri*. Duellman and Schwartz studied the Key West and Miami populations of *sagrei* and decided that the two were very similar and should be considered as *A. sagrei stejnegeri*. However, I have been unable to find any valid character to distinguish *sagrei stejnegeri* from the Cuban populations of *sagrei*. Various authors (Smith and Burger, Duellman and Schwartz) have utilized pigmentation and dewlap color of preserved specimens of *s. stejnegeri* and *s. sagrei* to distinguish the two forms. This has led to spurious distinctions being made between Cuban and Floridian populations. The type of preservative (alcohol or formalin) to which specimens are subjected, the time spent in the preservative, and the body color phase at the time of preservation, all affect the color and pattern of the animal. Little reliance can be placed on the dewlap color of a preserved anole. Smith and Burger (1949) describe the dewlap of *sagrei sagrei* as "light brown to light grey." Actually, after preservation, the color of the dewlap in Cuban *sagrei* may range from completely colorless (white) to almost black, and rarely some red pigment will be preserved. In life the dewlap of Cuban *sagrei* shows polymorphism — within the same populations in Camaguey the dewlap may be bright red, dark red, or ochraceous (brownish yellow).

It has been claimed that a further distinction between *stejnegeri* and Cuban *sagrei* is the fact that the midventral throat scales (scales at the edge of the dewlap) are light in the Florida specimens but black or dark grey in Cuban populations. I have been unable to verify this—Cuban specimens usually are devoid of any pigmentation on the throat scales. Some Cuban populations, such as the *bremeri*, do have black throat scales, but this character serves only to distinguish this form from the other Cuban populations.

The distribution of *sagrei* in Florida is discontinuous (Oliver, 1950; Duellman and Schwartz, 1958).<sup>1</sup> Its distribution pattern is that of an introduced species. Thus it exists in ports of entry which trade heavily with Cuba. The Key West population of *sagrei* has probably started to disperse (Duellman and Schwartz record a specimen from Cudjoe Key). However, it is not found in the central keys or in the keys close to the mainland. It is apparently restricted to edificarian habitats. Furthermore, it does not appear to be readily distinguishable in morphology from the Cuban populations of *sagrei*. I am, therefore, of the opinion that *sagrei stejnegeri* does not merit subspecific recognition.

*A. sagrei ordinatus* from the Bahamas is readily distinguishable from the other populations of *sagrei*. In the Bahaman lizards, in contrast to the other populations, the circumorbital semicircles are usually in contact (Oliver, 1950). Furthermore, the dewlap color and pattern of two specimens of *sagrei ordinatus* that I have seen from Bimini are very distinctive—yellowish or orange-yellow with two or three broken red stripes. Stejneger (1905), in a footnote, describes *sagrei ordinatus* as having, in life, an orange-colored dewlap. However, Rosen (1911) describes specimens from Andros and New Providence as having a yellowish-red dewlap when about 40 mm. in length (snout to vent), and further claims that larger specimens (55-60 mm.), have brown dewlaps with black scales.

*Anolis nelsoni* Barbour was described in 1914 from Swan Island, and in his description Barbour indicated that it was closely related to *sagrei*. It is distinguished from *sagrei* by having a "deep olive gray" dewlap, a pronounced caudal crest, and a lemon-yellow color to the head. I have here considered it as a subspecies, but it may merit recognition as a full species.

<sup>1</sup> The localities for *sagrei* in Florida are: St. Petersburg, Tampa, Lake Worth (probably *A. sagrei ordinatus*), Coral Gables, Miami, Key West, Cudjoe Key, and it has recently been found in Fort Myers (Stanley Rand, personal communication).

*A. sagrei mayensis* was described by Smith and Burger (1949) from Yucatan, and considered distinct from other *sagrei* in its larger size and some supposed scalation and color characters. The majority of specimens of male adult Bahaman and Cuban *sagrei* are between 55 and 60 mm. snout to vent length. The specimens of *bremeri* from Pinar del Rio are larger: the large adult males are over 60 mm. in length (maximum 67 mm.). The mainland *sagrei mayensis* from Mexico and Belice (Neill and Allen, 1959) are about the same size as the Cuban *bremeri*. Specimens of *sagrei nelsoni* from Swan Island are, however, even larger, the males reaching maximum snout to vent length of 70 mm. The Central American, Swan Island, and Mexican mainland forms are thus distinct from the majority of other populations on the basis of size. These various large forms merit further study. The interrelation of these populations is not clear, and their distribution may prove to be much wider than the present data indicate.

As mentioned previously, the dewlap color of the Cuban populations of *sagrei* is a polymorphic character. The majority of specimens have a dewlap of some shade of red—bright red, brick red, orange red, etc. However, within almost every Cuban population of *sagrei* there will be found some specimens with brownish or ochre-colored dewlaps. Off the south coast of Camaguey on the keys of the Laberinto de las Doce Leguas, the majority of the specimens have brown dewlaps. I have observed specimens with these various dewlap colors over prolonged periods of time in captivity. In no instance did the dewlap change color. The dewlap color may become darker or lighter; however, this appears to be a function of the melanophores on the scales and not of the colored skin between the scales.

Throughout most of Cuba *sagrei* is an extremely abundant lizard. It is the characteristic fence-post lizard on farms, in gardens, and in city parks. It is found in savannas, pine, and in coastal regions as well as near the beaches. In the broadleaf forests it is restricted to the large clearings and the open margins of the forest. This species together with *porcatus* and *allisoni* has been the most successful Cuban species to adapt to edificarian habitats (see Ruibal and Williams, 1961a, and Ruibal, 1961, for further discussion of the ecology of *sagrei*).

Alayo (1951) mentions the interesting fact that *sagrei* is not common in patios of Santiago de Cuba. Instead, *argenteolus*

together with *porcatus* are the common garden species. This indicates that *sagrei* is a more recent arrival to Oriente than *argentolus* and that it has not been able to or has not yet entered the edificarian habitat in this area. In Sagua de Tanamo, in northern Oriente, *sagrei* and *homolechis* are found on the same fence posts in farms and gardens. In Camaguey, to the west of Oriente, *homolechis* is never found outside of the forest habitat. *Homolechis* and *sagrei* have identical perching sites but differ in their mean body temperature (Ruibal, *op. cit.*) and presumably would be in direct competition with each other when in the same habitat. The situation at Sagua de Tanamo may thus be a recently created one which will in time yield the same habitat segregation as is exhibited by *sagrei* and *homolechis* in Camaguey.

*Anolis luteosignifer* Garman from Cayman Brac is a species related but distinct from *sagrei* (Barbour, 1914). I have not studied this species.

#### ANOLIS HOMOLECHIS Cope

*Xiphosurus homolechis* Cope, 1864, p. 169.

*Anolis homolechis*: Boulenger, 1885, p. 28; Barbour, 1914, p. 274; Barbour and Ramsden, 1919, p. 155; Ruibal and Williams, 1961b, p. 228.

*Anolis calliurus* Ahl, 1924, p. 249.

*Anolis muelleri* Ahl, 1924, p. 247.

*Anolis cubanus* Ahl, 1925, p. 87.

*Anolis patricius* Barbour, 1929, p. 37.

*Anolis homolechis homolechis*: Barbour, 1937, p. 127; Ruibal and Williams, 1961b, p. 231.

*Anolis homolechis patricius*: Barbour, 1937, p. 127.

*Anolis quadriocellifer* Barbour and Ramsden, 1919, p. 158.

*Anolis homolechis quadriocellifer*: Barbour, 1937, p. 127; Ruibal and Williams, 1961b, p. 231.

*Type locality.* Here restricted to La Habana, Habana.

*Definition.* Dorsals small and granular; ventrals smooth and in diagonal and transverse rows. Supraorbital semicircles separated by a single scale; posterior medial margins of the mentals separated by small postmentals (Fig. 7a); supracarpal and supradigital scales usually smooth or with a single keel; a single undivided scale anterior to the nares (Fig. 8); scales along the posterior margin of the interparietal large and sharply demarcated from the dorsals. Tail laterally compressed and with a crest. The general body color ranges from light tan, through reddish brown, brown, and black. Usually there is some evidence

of horizontal stripes on the flanks and four dark chevrons on the dorsum. Yellow markings may be present laterally. The dewlap is variable in color (see below). The iris is gold or metallic brown. Maximum snout to vent length, ♂, 56 mm. Females smaller.

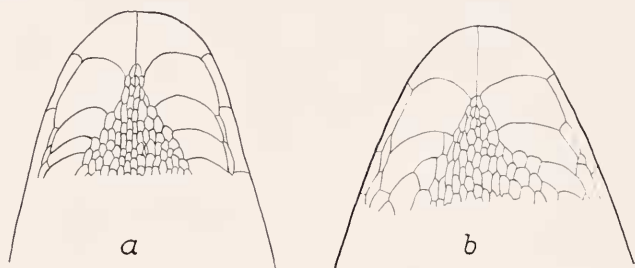


Figure 7. (a) A few small scales separate the posterior medial margins of the mentals in *A. homolechis* and *A. mestrei*. (b) The gulars do not separate the posterior medial margins of the mentals in *A. allogus*, *A. ahli*, *A. rubribarbus*, and *A. imias*.

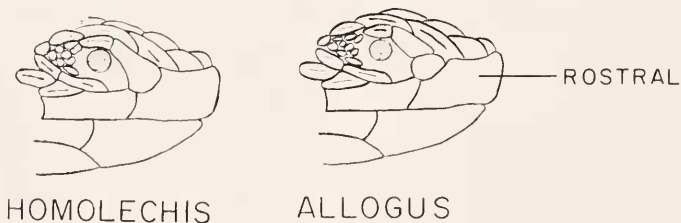


Figure 8. The structure of the scale anterior to the external naris in *A. homolechis* and *A. allogus*.

*Distribution.* This species has an islandwide distribution and is also found on Isla de Pinos.

*Remarks.* Numerous populations of this species are characterized by distinctive dewlap colors and patterns—pure white, grey, and yellow. The population of *homolechis* at the extreme western end of the island, Cabo San Antonio, is distinctive enough to warrant recognition as a subspecies, *A. homolechis quadriocellifer* (Barbour and Ramsden). When more data are available, it will be possible to interpret the status of the other color variants of *homolechis*. The morphology and variation of *homolechis* is discussed in detail in Ruibal and Williams (1961b).

*A. homolechis quadriocellifer* differs from the other populations of *homolechis* in having a yellow dewlap with red stripes and a white margined ocellus above the forelimb.

Throughout the island, *homolechis* is found inhabiting the forest margins and within the more open and sparse forests. It is found from the forests of the Sierra Maestra (from almost 6,000 feet) and the palm-pine savannas of Oriente to the "mogotes" of Pinar del Rio—anywhere that natural forest vegetation has survived. In some localities—Sagua de Tanamo, Oriente—this species has also adapted to the man-made plant associations in gardens, farms, and pastures. The thermal ecology of this species is discussed in Ruibal (1961).

#### ANOLIS MESTREI Barbour and Ramsden

*Anolis mestrei* Barbour and Ramsden, 1916, p. 19; Barbour and Ramsden, 1919, p. 161; Ruibal and Williams, 1961b, p. 236.

*Anolis allogus mestrei*: Barbour, 1937, p. 120.

*Type locality.* Valle de Luis Lazo, Pinar del Rio.

*Definition.* The scalation of this species is similar to that of *homolechis* except that the posterior supraciliaries of *mestrei* are small and granular while those of *homolechis* are larger, elongate, and keeled. The ear of *mestrei* is round while that of *homolechis* is higher than wide. The body color ranges from dark to light grey and usually has a greenish cast. Yellow and orange spots are present over the body. The dewlap has a dark red basal spot with two orange-yellow stripes and a broad white margin. The iris is yellowish. Maximum snout to vent length, ♂, 55 mm. Females smaller.

*Distribution.* Restricted to the broadleaf forests of the limestone "mogotes" and mountains of the Sierra de los Organos and the Sierra del Rosario in Pinar del Rio.

*Remarks.* This species is sympatric with *allogus* and *homolechis*, species to which it is closely related. *Mestrei* appears to be more terrestrial than either of the other species, and it is usually found on the limestone rocks rather than on tree trunks. It appears to be restricted to the shady portions of the forest.

#### ANOLIS ALLOGUS Barbour and Ramsden

*Anolis allogus* Barbour and Ramsden, 1919, p. 159; Ruibal and Williams, 1961b, p. 215.

*Anolis abatus* Ahl, 1924, p. 248.

*Anolis allogus allogus*: Barbour, 1937, p. 120.

*Type locality.* Bueycito, S. of Bayamo, Oriente.

*Definition.* Dorsals small and granular. Ventrals smooth and in diagonal or transverse rows. Supraorbital semicircles separated by two scales; a transverse suture between the mentals and the postmentals (Fig. 7b); supracarpal and supradigital scales multicarinate and mucronate; scale anterior to the naris divided by a horizontal suture (Fig. 8); scales around the posterior margin of the interparietal small and grading into the dorsals. Tail laterally compressed and usually with a crest. Body color reddish-brown with yellow reticulations. Dewlap ground color ranging from yellow to apricot and with three or four reddish stripes and a white margin. Iris blue. Maximum snout to vent length, ♂, 58 mm. Females smaller.

*Distribution.* The species is probably islandwide in its distribution; however, it is limited to the deep broadleaf forests and has never been found outside of the forest. It has not been recorded on Isla de Pinos.

There are no records of this species from Matanzas, or Las Villas. However, this is probably the result of the destruction of the natural habitat of this species by agriculture (Ruibal and Williams, 1961b).

*Remarks.* This species shows little geographic variation outside of minor color and pattern differences of the dewlap.

In the broadleaf forests of Camaguey, Oriente, and Pinar del Rio, this is a common and easily seen lizard. The males perch a few feet from the ground on the trunks of the smaller trees. The dewlap is large and shows up brilliantly against the dark shaded background of the forest. It is a shade-dwelling species and in most parts of its range it is sympatric with *A. lucius*. The thermal ecology of *allogus* and *lucius* is discussed in Ruibal (1961).

#### ANOLIS AHLI Barbour

*Anolis ahli* Barbour, 1925, p. 168; Ruibal and Williams, 1961b, p. 221.

*Anolis allogus ahli*: Barbour, 1937, p. 120.

*Type locality.* Sierra de Trinidad, Las Villas.

*Definition.* Scalation like that of *A. allogus*. The males of this species appear to lack a caudal crest. The body color usually shows a greenish cast and the general color may shift from tan to dark brown. A common body pattern is a "salt and pepper" speckling. The dewlap has a large red spot that is surrounded



by a broad yellow-white area. The iris is blue. Maximum snout to vent length, ♂, 58 mm. Females smaller.

*Distribution.* Known only from the Sierra de Trinidad in Las Villas.

*Remarks.* This is a forest-dwelling species found in the deeply shaded portions of the forest.

#### ANOLIS RUBRIBARBUS Barbour and Ramsden

*Anolis rubribarbus* Barbour and Ramsden, 1919, p. 156; Ruibal and Williams, 1961b, p. 222.

*Anolis homolechis rubribarbus*: Barbour, 1937, p. 127.

*Type locality.* Puerto de Cananova, near Sagua de Tanamo, Oriente.

*Definition.* The scalation of this species is like that of *A. allogus* except that the scale anterior to the naris is usually single in *A. rubribarbus*. There is a well developed caudal crest. The body color is usually grey, ranging from a pale grey to almost black. Yellow spots and reticulations may be present on the flanks. The body may show various color and pattern phases ranging from a "salt and pepper" pattern in light grey to a pattern of blackish vertical bands separated by yellowish or grey bands. The dewlap has 4-5 thin red lines on a deep yellow ground color and a white margin. The iris is blue grey. Maximum snout to vent length, ♂, 62 mm. Females smaller.

*Distribution.* This species is known from the north coast of Oriente from Cananova to Punta Gorda east of Moa. It may extend further east.

*Remarks.* Like *ahli* this species is very closely related to *allogus*, has a limited distribution, and is allopatric to *allogus*. More detailed information about the populations of *allogus* on the north coast of Oriente will demonstrate whether *rubribarbus* needs to be considered as a subspecies of *allogus*.

This is a forest dwelling species.

#### ANOLIS IMIAS Ruibal and Williams

*Anolis imias* Ruibal and Williams, 1961b, p. 237.

*Type locality.* Imias, south coast of Oriente.

*Definition.* In scalation similar to *homolechis* but differing in having smooth brachial scales and smooth supraocular scales, and having the postmentals bordering the mental along a transverse border. This species is known only from the type and

paratype. The only thing known about its color in life is that the dewlap is brown. Maximum snout to vent length,  $\delta$ , 65 mm. Females smaller.

*Remarks.* This species is known only from the type and paratype. It is the only new species of Cuban *Anolis* described since the publication of Barbour's 1937 checklist.

#### ANOLIS LUCIUS Duméril and Bibron

*Anolis lucius* Duméril and Bibron, 1837, p. 105; Barbour and Ramsden, 1919, p. 138; Barbour, 1937, p. 129.

*Type locality.* Cuba.

*Definition.* Smooth head scales; circumorbital semicircles in broad contact medially (Fig. 9). Dorsals small and smooth. Ventrals smooth and in transverse and diagonal rows. Three transparent palpebral scales on the lower eyelid. Supraocular scales irregular in shape (not transversely enlarged). Ear opening large and the tympanum completely exposed and the extracolumella visible (Fig. 10).

The overall body color of central and eastern specimens varies from a semi-transparent faint greenish blue to a yellowish tan. The venter is metallic yellow. Four middorsal reddish blotches are sometimes evident. The head and neck is marked by well-defined light stripes that make a chevron-like pattern on the nuchal area. The parietal eye is in the center of a light spot.

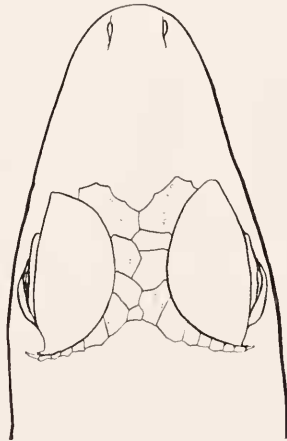


Figure 9. The supraorbital semicircles are in broad contact medially in *loysiana*, *argillaceus*, *lucius*, and *argenteolus*.

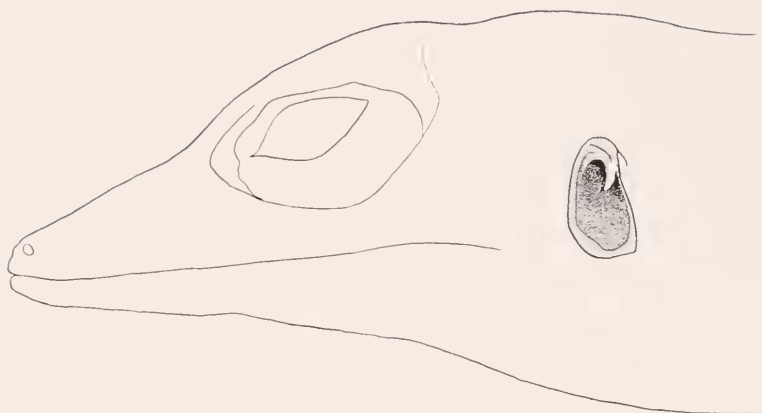


Figure 10. The tympanum of *A. lucius* showing a prominent extra-columella.

The iris is brown. The few specimens of *lucius* from Pinar del Rio that I have observed alive had an overall brilliant blue color and no red dorsal spots.

Dewlap yellowish at the base. A broad white margin having two or three grey stripes. Maximum snout to vent length, ♂, 66 mm. Females smaller than males.

*Distribution.* From Pinar del Rio to western Oriente. It is apparently absent from the mountainous eastern and southern portions of Oriente. Confined to forested areas.

*Remarks.* This species has previously been considered to be restricted to limestone areas, and it was thought to select caves and cliffs as its preferred habitat (Barbour and Ramsden, 1919). In lowland forests in Camaguey, where no limestone exists, *lucius* inhabits very large tree trunks (such as the strangler fig, *Ficus*). In the forests of Oriente, Pinar del Rio, Camaguey, and Las Villas, I have seen specimens of this species on every "jagüey" (as the strangler fig is known in Cuba) examined. Apparently *lucius* is specialized in that it is a shade-preferring form (Ruibal, 1961) limited to a substratum of large and intricate surfaces. This type of substratum preference is correlated with the gecko-like, communal egg-laying habits of the species (Dunn, 1926; Hardy, 1957). On limestone caves and cliffs, large numbers of eggs (over 100) are attached to the roofs of certain crevices and hollows in the rock. In the caves, this is usually in the twilight zone of the cave. On the strangler figs, the eggs are

deposited in the large interstices made by the contorted growth of the fig, or in the hollows created by the rotting of the parasitized tree. These sites are thus ecologically equivalent to the limestone caves. In Las Villas I have observed *Lucius* together with *Tarentola americana* in the hollow of a large mamoneillo (*Melicocca bijuga*). Allen and Neill (1957) report finding these two lizards sympatrically and comment on the gecko-like habits of *A. lucius*.

This species is probably the most vocal of the Cuban anoles. They not only will squeak when captured but can, on occasion, be heard to make the same sound while scurrying about on the vertical surfaces at the entrance of eaves. As Barbour and Ramsden (1919) have observed, Cuban peasants ascribe the call of various species of *Eleutherodactylus* to *Lucius*.

A further specialization demonstrated by *Lucius* is the presence of transparent palpebral scales on the lower eyelid. These scales besides being transparent are bordered by a black, but translucent pigment. Williams and Hecht (1955) have interpreted this condition as an example of "sunglasses": the lizard normally dwelling in deeply shaded areas and protected by its pigmented palpebral scales when it ventures into brightly illuminated areas — the palpebrals acting to reduce the intensity of the light.

Smith and Willis (1955) have described a peculiar variation found in some populations of *Lucius*: in the females and juveniles, the tail is always round in cross section, but in the males the tail may vary from round to laterally compressed.

#### ANOLIS ARGENTEOLUS Cope

*Anolis argentcolus* Cope, 1861, p. 213; Barbour and Ramsden, 1919, p. 140; Barbour, 1937, p. 129.

*Type locality.* Cafetal Monte Verde, Sierra de Yateras, east of the Bahía de Guantánamo, Oriente.

*Definition.* Similar to *Lucius* in scalation. There are two transparent palpebrals on the lower eyelid of *argentcolus*, while *Lucius* usually has three palpebrals. In habitus the specimens of *argentcolus* are thinner and longer limbed than *Lucius*, and are also smaller in size.

The general body color of *argentcolus* is brown and lacks the striped head and neck region so characteristic of *Lucius*. The body is reticulated with yellow and/or grey. The dewlap in male *argentcolus* has a basal area that is grey or brown while

the rest of the dewlap is white. Maximum snout to vent length, ♂, 50 mm. Females smaller.

*Distribution.* Limited to Oriente and southeastern Camaguey. The Camaguey specimens (M.C.Z.) were collected northeast of Santa Cruz del Sur.

*Remarks.* I have always observed this species in the shade in broadleaf forests. It inhabits large as well as small tree trunks and does not show the specialization for large surfaces that *lucius* demonstrates. Barbour and Ramsden claim that it is partial to limestone. This is probably true, but I have never had the opportunity to collect *argentcolus* in habitats containing limestone exposures. Barbour and Ramsden as well as Alayo report the species to be common around houses in Santiago. As Barbour and Ramsden have observed, this species appears to be the only shade-dwelling form that has successfully invaded edificarian habitats. Alayo also reports it from forests on the lower portions of the tree trunks.

The report (Cooper, 1958) of *argentcolus* from the *Coccoloba* association on the beach along the south coast of Oriente appears to be in error. The species he observed was probably *angusticeps*.

#### ANOLIS LOYSIANA Duméril and Bibron

*Anolis loysiana*: Duméril and Bibron, 1837, p. 100; Boulenger, 1885, p. 42;

Barbour and Ramsden, 1919, p. 146; Barbour, 1937, p. 129.

*Acantholis loysiana*: Cocteau, 1838, p. 141.

*Type locality.* Cuba.

*Definition.* Similar to *argillaceus*. The most prominent difference is the presence of large spine-like scales on the body and limbs of *loysiana*. The dorsals between the spine-like scales are small, flat, and smooth. The two species are alike in other scale characters. In *loysiana* the tail is round in cross section and the body is slightly compressed dorsoventrally.

In coloration, *loysiana* has the same greyish to brownish coloring with dark reticular markings. However, it lacks the longitudinal striping often seen in *argillaceus*. When on a grey-barked tree, specimens of *loysiana* are cryptic: the ashgrey color, reticulations, and spines camouflaging the animals. In Camaguey the dewlap color varied from a tan color to pink-tan to pale orange-red. Maximum snout to vent length, ♂, 40 mm. Females smaller.

*Distribution.* Islandwide. Not recorded from Isla de Pinos.

*Remarks.* Gundlach (1880) reported this to be an islandwide

species and a forest-dwelling form. In Camaguey, where I have collected *loysiana*, it has always been on the trunk of trees in relatively open savanna-like clearings. It has been in areas formerly occupied by forest but partially cleared by agriculture. At the one locality in Camaguey where the species was relatively abundant (15 km. SW of Camaguey), it was usually on the trunk of "guamas" (*Lonchocarpus* sp.).

#### ANOLIS ARGILLACEUS Cope

*Anolis argillaceus* Cope, 1862, p. 176; Barbour and Ramsden, 1919, p. 147; Barbour, 1937, p. 129.

*Type locality.* Cafetal Monte Verde, Sierra de Yateras, east of the Bahía de Guantánamo, Oriente.

*Definition.* Head scales smooth; supraorbital semicircles in broad contact medially; 3 transversely enlarged supraoculars (Fig. 11); ear opening small and the extracolumella not visible. Dorsals smooth, small, and flat. Ventrals smooth with a rounded posterior margin and in diagonal rows; some of the ventrals in longitudinal rows on the anterior part of the venter, others in vague transverse rows. Tail laterally compressed. Males with very large hemipenes (the hemipenial swelling in the tail extending posteriorly to the same level as the heel of the hind foot when adpressed against the tail). Body laterally compressed.

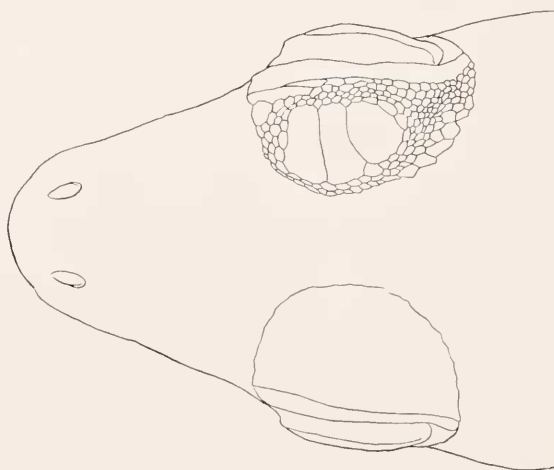


Figure 11. The transversely enlarged supraocular scales of *A. argillaceus*.

General body color greyish. Reticular and longitudinal dark markings over the body. In the light phase the animal is a very pale grey while in the dark phase it becomes brownish. The dewlap is usually very large. In Camaguey, the dewlap colors are variable — I have seen specimens with yellow, orange-yellow, and red dewlaps. Maximum snout to vent length, ♂, 45 mm. Females smaller.

*Distribution.* Known from Oriente and the eastern half of Camaguey and recently from a single specimen reported from Habana (Collette, 1961).

*Remarks.* In Camaguey I have found this species to be rare. When collected, it has always been in open savanna-like habitats, the animals being found on the trunks of relatively large trees. The species is apparently very common in some parts of Oriente. Alayo (1951) reports that it is a common fence-post lizard in Santiago; Barbour and Ramsden reported it from coffee groves and on "guásimas" (*Guazuma ulmifolia*) in Oriente. A number of the Camaguey specimens that I collected were also found on the trunks of "guásimas."

Most of the specimens of *argillaceus* show homogeneous dorsal and lateral scales. However, on some specimens a careful examination of the scales under a microscope shows the presence of a few isolated and scattered enlarged scales. These scales are reminiscent of the spine-like scales of *loysiana*. The two species are obviously closely related and are apparently sympatric in Camaguey and Oriente. On one occasion a specimen of *argillaceus* was captured in Camaguey on the same tree trunk that contained a specimen of *loysiana*. In Camaguey both species were always found in comparable ecological situations.

#### ANOLIS ALUTACEUS Cope

*Anolis alutaceus* Cope, 1861, p. 212; Barbour and Ramsden, 1919, p. 153.

*Anolis clivicolus* Barbour and Shreve, 1935, p. 251.

*Anolis alutaceus alutaceus*: Barbour, 1937, p. 124.

*Anolis alutaceus clivicolus*: Barbour, 1937, p. 124.

*Type locality.* Cafetal Monte Verde, Sierra de Yateras, east of the Bahía de Guantánamo, Oriente.

*Definition.* Head scales with longitudinal as well as transverse rugosities (Fig. 12); single row (*a. alutaceus*) or two rows (*a. clivicolus*) of scales between the supraorbital semicircles; supraorbitals separated from the supraorbital semicircle by a row of small scales. A wide middorsal zone of enlarged, keeled scales

in longitudinal rows and having the posterior margins truncate (Fig. 13). Ventrals smooth. Limb scales multicarinate. Body laterally compressed and tail round in cross section.

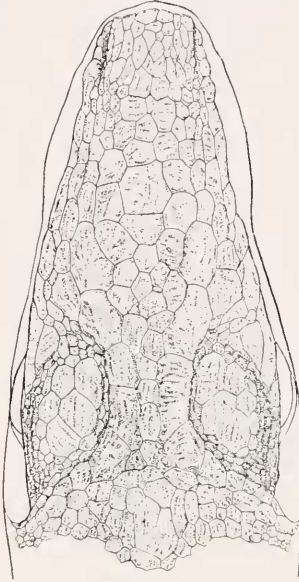


Figure 12. Head scales of *A. alutaceus alutaceus*.

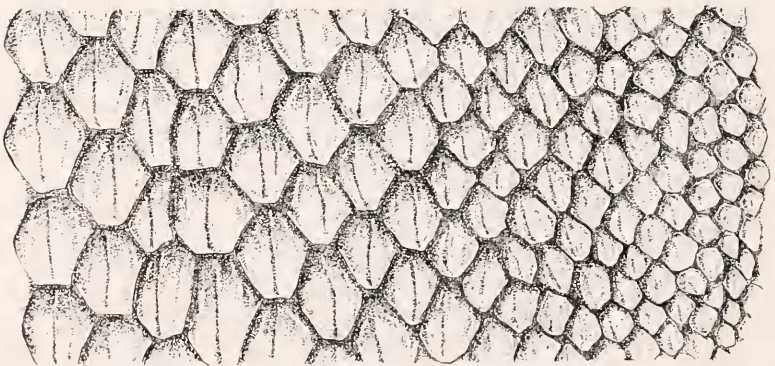


Figure 13. The dorsal and right lateral scales of *A. alutaceus clivicolus*. The dorsals are in longitudinal rows, have truncate posterior margins and are larger than the lateral scales.



In *alutaccus* the general body color is light or dark brown with no particularly prominent pattern; tail with dark crossbars; dewlap large and yellow; iris bright blue; a white stripe from below the eye to the ear is usually prominent. No color data are available from living specimens of *a. clivicolus*. The pattern of preserved specimens appears to resemble *a. alutaccus* except that no prominent white stripe is evident below the eye. Maximum snout to vent length: *a. alutaccus*, ♂, 36 mm.; *a. clivicolus*, ♂, 45 mm.

*Distribution.* Islandwide and Isla de Pinos. The subspecies *a. clivicolus* is restricted to the higher elevations (4,000 feet) of the Sierra Maestra of Oriente.

*Remarks.* In 1937 Barbour made *clivicolus* a subspecies of *alutaccus* with the single comment that the two forms seemed to intergrade. The two forms can be distinguished by the characters cited above in the definition and also, and probably most readily, by the body proportions. In *a. alutaccus* the body is thin, the limbs very elongate, the tail remarkably thin, and the head long snouted. In contrast, specimens of *a. clivicolus* are larger, more robust, with a less obvious elongation of the appendages or head. In the series of specimens from the Sierra Maestra (M.C.Z.) all intermediate conditions between *a. alutaccus* and *a. clivicolus* are found. Actually *a. clivicolus* is the only known altitudinal race of lizards in Cuba. This is in contrast to the situation in Puerto Rico where a number of species are segregated by altitudinal difference in habitat (Rand, MS).

*A. a. alutaccus* is a common lizard in the broadleaf forests of lowland Oriente, and the rest of the island. It is characteristically found on small tree trunks, stems, twigs, grass, and even rocks. The lizards are usually perched about a foot from the ground. In its movement it often progresses by leaping rather than climbing or running. Nothing is known of the ecology of *a. clivicolus*. Collette (1961) describes the ecology of *a. alutaccus* from Habana.

Williams (1961) discusses the evolutionary relationship of the Cuban "grass" anoles (*alutaccus*, *cyanopleurus*, and *spectrum*) with the grass anoles of Hispaniola and Puerto Rico.

#### ANOLIS SPECTRUM Peters

*Anolis spectrum* Peters, 1863, p. 136; Barbour and Ramsden, 1919, p. 149; Barbour, 1937, p. 124.

*Type locality.* Vicinity of Matanzas and Cardenas, Matanzas.

*Definition.* Head scales with longitudinal striations; supraocular scales medially in direct contact with the supraocular semicircles (Fig. 14); occipitals, nuchals and dorsals confluent, showing no demarcation. A middorsal zone of enlarged scales; the dorsals are keeled and as wide as long and do not have a truncate posterior margin (Fig. 15). Laterals smaller, keeled, and imbricate. Ventrals in longitudinal rows that converge toward the midventral line. Limbs with multicarinate scales. Tail round in cross section.

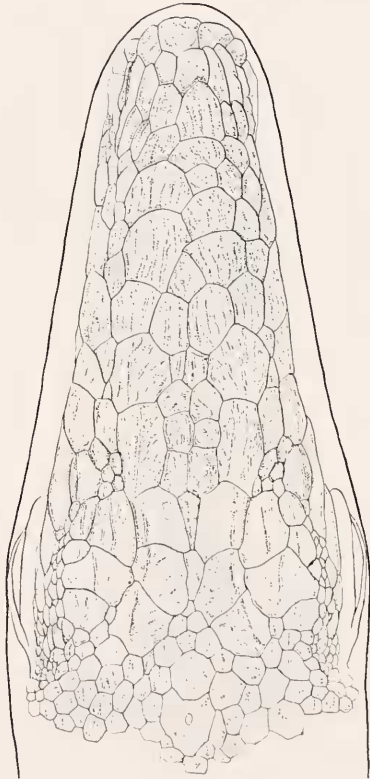


Figure 14. The head scales of *A. spectrum*. The supraocular scales are in direct contact with the supraorbital semicircles.

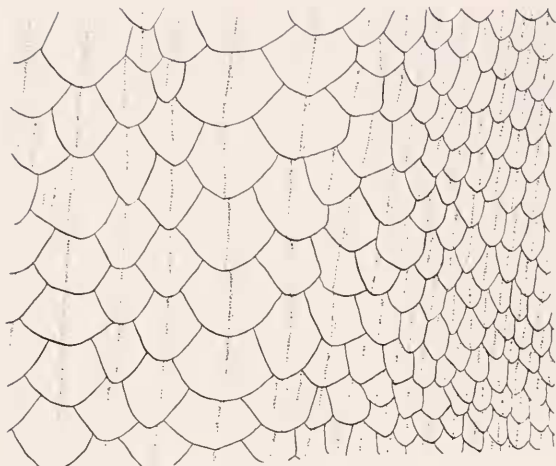


Figure 15. The dorsal and right lateral scales of *A. spectrum*. The lateral scales are imbricate and the dorsals are as wide as long and are not truncate.

In males, the middorsal area is a yellow-cream color, and the lateral surfaces mahogany (red-brown); venter reddish with a midventral streak; chin yellow. Dewlap yellow. In females the middorsal zone is reddish-brown, the lateral surfaces brown, and the venter reddish with a yellow midventral streak from throat to vent. Maximum snout to vent length, ♂, 36 mm. Females smaller.

*Distribution.* Currently known only from the Sierra de Trinidad in Las Villas. However, the type specimens collected by Gundlach were from Matanzas. The destruction of the forest in most of lowland central Cuba may have destroyed this species in all areas outside of the Sierra de Trinidad.

*Remarks.* This species is restricted to the broadleaf forests and is found on grass and twigs, along the paths in the forest floor and the dry stream beds. Gundlach recorded it in the forests in the vicinity of Matanzas and Cardenas. Dunn (1926) claimed *spectrum* was rarer in the lowland forests than in the mountain forests of the Sierra de Trinidad. Dunn claimed that in the mountains *spectrum* was as common as *alutaccus*. My collecting experiences in the Sierra de Trinidad confirm Dunn in that both species are equally abundant.

Schwartz and Ogren (1956) record *spectrum* from Santiago de Cuba. This is probably in error.

## ANOLIS CYANOPLEURUS Cope

*Anolis (Dracontura) cyanopleurus* Cope, 1861, p. 211.

*Anolis cyanopleurus*: Boulenger, 1885, p. 69; Barbour and Ramsden, 1919, p. 150; Barbour, 1937, p. 124.

*Type locality.* Cafetal Monte Verde, Sierra de Yateras, east of the Bahia de Guantanamo, Oriente.

*Definition.* Head scales with longitudinal striations (Fig. 16); supraoculars separated from the supraorbital semicircles by a row of small scales. A zone of enlarged, keeled scales in longitudinal rows and having a posterior margin truncate. Dorsals often multicarinate rather than with a single keel. Laterals small, not imbricate. Limb scales multicarinate. Ventrals keeled, the anterior ventrals in longitudinal and diagonal rows, the posterior scales in vague longitudinal or transverse rows. Tail laterally compressed.

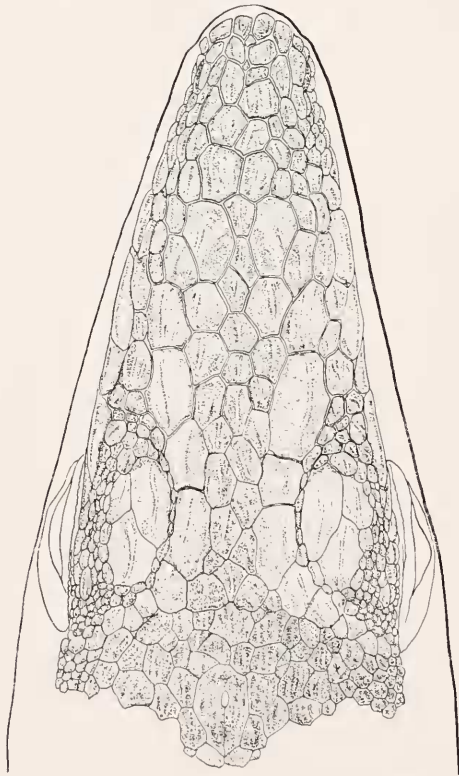


Figure 16. Head scales of *A. cyanopleurus*.

Gundlach (1880) describes a living specimen from the Sierra Maestra as having a blue iris and a general body color of olive-brown. Barbour and Ramsden (1919) describe what may be a living specimen as having a russet dorsal zone and green lateral surfaces and a white belly. They describe the dewlap as ashengrey in color. Maximum snout to vent length, ♂, 39 mm. Females smaller.

*Distribution.* Apparently restricted to the mountainous areas of southern Oriente. However, Gundlach records obtaining it in the Sierra Maestra as well as near Cardenas in the province of Matanzas. Since Gundlach knew *spectrum* and *alutaccus*, it seems doubtful that he would confuse a specimen of one of these species with *cyanopleurus*. His description of the color of the Matanzas specimen also fits the Barbour and Ramsden description of *cyanopleurus* since Gundlach cites the animals as having greyish-green and bluish coloration—neither of these colors being found in *alutaccus* or *spectrum*. It is, therefore, very possible that the distribution of *cyanopleurus* is (or was) not limited to Oriente.

*Remarks.* Gundlach records this as a forest species. Alayo describes it as inhabiting grass. It would appear that *cyanopleurus* is ecologically an eastern equivalent of *spectrum*—a grass anole of the forest floor.

#### ANOLIS VERMICULATUS Duméril and Bibron

*Anolis vermiculatus* Duméril and Bibron, 1837, p. 128.

*Deiropyx vermiculatus*: Fitzinger, 1843, p. 17; Barbour and Ramsden, 1919, p. 130; Barbour, 1937, p. 117.

*Type locality.* Restricted to Viñales, Pinar del Rio.

*Definition.* Two rows of scales between the supraocular semi-circles; head scales keeled; suborbitals separated from the supralabials by a row of small scales (Fig. 17); frontal and canthal ridges; pineal in the center of a large light-colored scale. Dorsals keeled and smaller than the ventrals. Ventrals keeled and in diagonal and transverse rows. Digital pads narrow; tail laterally compressed; no dewlap; a transverse gular fold.

Adults variegated in olive green and bluish green. The gular fold is yellowish; iris, blue. The color data are from a living specimen described in detail by Gundlach (1880). Maximum snout to vent length, ♂, 122 mm. Females smaller than the males.

*Distribution.* Reported only from Pinar del Rio.

*Remarks.* This large lizard (it is exceeded in size only by *A. equestris* and *C. chamaeleonides*) has the distinction of being a truly aquatic species. Gundlach (*op. cit.*) describes it as inhabiting the trunks and branches of trees along the edges of streams and leaping into the water and hiding under rocks and roots at the bottom of the stream. Neill and Allen (1957) observed the species in its native habitat and described its vocal ability; it produces squeaks and mewes. It is apparently an insectivorous species and feeds out of the water. *A. vermiculatus*, like the Central American *Basiliscus*, can also run on its hind legs on the surface of the water.

Most of the localities from which *vermiculatus* has been reported are from the western end of Pinar del Rio. However, Gundlach reports the species from near Taco-Taco which is in the eastern half of the province.

The specimen described by Barbour and Ramsden is an immature male (snout to vent, 70 mm.) and their color description does not fit that of Gundlach, nor the colors of the larger preserved specimens I have examined.

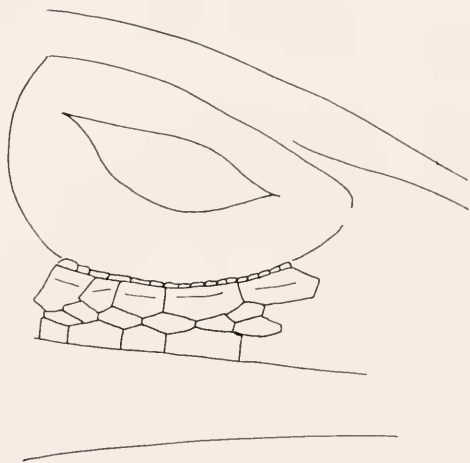


Figure 17. Suborbital scales of *A. vermiculatus*.

#### ANOLIS BARTSCHII (Cochran)

*Deiropyx bartschii* Cochran, 1928, p. 169; Barbour, 1937, p. 118.

*Type locality.* Baños de San Vicente, Pinar del Rio, Cuba.

*Definition.* One row of scales between the supraocular semi-circles; scales of the snout smooth; suborbitals in contact with supralabials (Fig. 18). Dorsals and ventrals smooth, and the ventrals in transverse and diagonal rows. Digital pad large and dilated. Tail round in cross section. Ear opening very large, the extracolumella visible. No dewlap. A transverse gular fold.

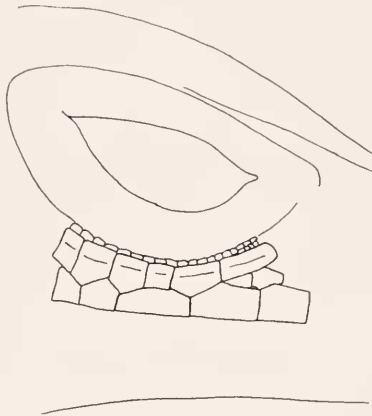


Figure 18. Suborbital scales of *A. bartschi*.

Cochran describes the male type as having yellow vertical wavy stripes edged with black on the sides and a green dorsum, the venter straw yellow and the gular fold deeper yellow. Maximum snout to vent length, ♂, 76 mm. Females smaller than the males.

*Distribution.* Known only from the western half of Pinar del Rio.

*Remarks.* This species though originally placed in the genus *Deiroptyx*, (together with *vermiculatus*) does not resemble *vermiculatus* in any character except the presence of a transverse gular fold rather than a dewlap. In many of its external characters, as well as ecology, *bartschi* resembles *lucius* more than any of the other anoline species. *A. bartschi* is not aquatic, but is instead found on the walls of limestone caves and cliffs (Cochran, 1928).

KEY TO THE CUBAN SPECIES OF ANOLINE LIZARDS

- 1. A middorsal crest of compressed triangular vertical scales.....2
- No middorsal crest.....3

2. Row of enlarged triangular scales from mental to anterior border of dewlap (Fig. 1); greyish body color, never green; large head casque overlapping neck in adults. . . . . *Chamaelcolis chamaeleonides* p. 481  
No row of enlarged triangular scales on throat; green or brown in color, never grey; head casque not overlapping the neck. . . . .  
..... *Anolis equestris* p. 482
3. Transparent scales on lower eyelid. . . . . 4  
No transparent scales on lower eyelid. . . . . 5
4. Usually three transparent scales on the lower eyelid; light stripe along upper labials, below eye, and running diagonally through dorsal margin of ear opening to the middorsal line, another light stripe from ventral margin of ear opening to middorsal line; yellow at base of dewlap, maximum snout-vent length = 70 mm . . . . . *A. lucius* p. 500  
Usually two transparent scales on the lower eyelid; head stripes never as above; brown or grey at base of dewlap; maximum snout-vent length = 50 mm. . . . . *A. argenteolus* p. 502
5. Three to four transversely enlarged supraoculars (Fig. 11); the supra-orbital semicircles in broad contact medially (Fig. 9); ventrals smooth; head scales smooth. . . . . 6  
Supraoculars not transversely enlarged; the supraorbital semicircles not in broad contact medially; ventrals smooth or keeled; head scales smooth, keeled, or rugose . . . . . 7
6. Many enlarged spine-like scales on the body and limbs; body dorso-ventrally compressed . . . . . *A. loysiana* p. 503  
No enlarged spine-like scales on the body and limbs; body laterally compressed . . . . . *A. argillaceus* p. 504
7. Supraocular scales medially in direct contact with the supraorbital semicircles (Fig. 14); dorsals as wide as long; lateral body scales keeled and imbricate (Fig. 15); occipitals, nuchals, and dorsals confluent, showing no demarcation. . . . . *A. spectrum* p. 507  
Not as above . . . . . 8
8. A wide middorsal zone of enlarged, keeled, scales having the posterior margin truncate (Fig. 13); scales of the middorsal zone in longitudinal rows and larger than the lateral scales; dorsal head scales are striated . . . . . 9  
No middorsal zone of enlarged, truncate scales; if middorsal scales are enlarged they are keeled, pointed and imbricate; head scales keeled, rugose or striated . . . . . 10
9. Ventrals keeled; head scales with longitudinal striations (Fig. 16); middorsal zone of enlarged scales evident on the nape; tail laterally compressed . . . . . *A. cyanopleurus* p. 510  
Ventrals smooth; head scales striated, the scales of the snout with transverse as well as longitudinal rugosities (Fig. 12); tail round in cross section . . . . . *A. alutaceus* p. 505
10. A transverse gular fold; no dewlap. . . . . 11  
No transverse gular fold; males with a dewlap; some females with a small dewlap . . . . . 12



11. Tail laterally compressed; suborbital scales separated from supralabials by a row of small scales (Fig. 17); digital pad narrow . . . . .  
*A. vermiculatus* p. 511  
 Tail round in cross section; suborbital scales in contact with supralabials (Fig. 18); digital pad large and dilated . . . . .  
*A. bartschi* p. 512
12. Ventral scales in regular transverse rows; tail round in cross section . . . . . 13  
 Ventral scales not in transverse rows; in diagonal and/or longitudinal rows; tail laterally compressed . . . . . 16
13. More than five scales bordering the rostral posteriorly; the anteriormost sublabials longer than wide; never green in color . . . . .  
*A. angusticeps* p. 488  
 Five scales bordering the rostral posteriorly (Fig. 2); anteriormost sublabials wider than long; color sometimes green . . . . . 14
14. Dorsal surface of head flat; dorsal head scales flat and pavement-like with longitudinal striations (Fig. 5); smaller, maximum snout-vent length = 40 mm . . . . .  
*A. isolepis* p. 487  
 Dorsal surface of head not flat, males with well developed frontal ridges, females and young with evidence of a frontal depression; dorsal head scales rugose, keeled, or striated; larger, maximum snout-vent length = 75 mm . . . . . 15
15. Ear opening circular; males with frontal ridges higher than the canthal ridges (Fig. 3) . . . . .  
*A. porcatas* p. 484  
 Ear opening with an elongate depressed posterior margin; canthal ridges higher than the frontal ridges (Fig. 4) . . . . .  
*A. allisoni* p. 486
16. Ventrals keeled and with pointed posterior margins . . . . . 17  
 Ventrals smooth and with rounded posterior margins . . . . . 18
17. A conspicuous zone of enlarged, keeled, pointed scales in longitudinal rows; five longitudinal light stripes on body; a single very elongate suborbital scale . . . . .  
*A. ophiotepis* p. 489  
 No conspicuous middorsal zone of enlarged scales; no longitudinal light stripes on the body; several short suborbital scales . . . . .  
*A. sagrei* p. 490
18. Supraocular and brachial scales smooth and the gulars bordering the mental along a transverse suture; dewlap brown . . . . .  
*A. imias* p. 499  
 Not as above . . . . . 19
19. Supracarpal and supradigital scales multicarinate; gulars bordering the mental along a transverse suture (Fig. 7b); two scales separating the supraorbital semicircles . . . . . 20  
 Supracarpal and supradigital scales smooth, or with some scales having one or two keels; a few small postmental scales separating the posterior medial margins of the mentals (Fig. 7a); a single scale separating the supraorbital semicircles . . . . . 22
20. Body color greyish; dewlap with 4 or 5 stripes of red on a bright yellow background, the edges of the dewlap white . . . . .  
*A. rubribarbus* p. 499  
 Body color not greyish; dewlap not as above . . . . . 21
21. Dewlap with a yellowish or tan background color and with 2 or 3 reddish or orange bars; body color reddish-brown . . . . .  
*A. allogus* p. 497

- Dewlap with a large red basal spot on a yellow background; body color reddish or greenish. . . . . *A. ahli* p. 498
22. Small granular posterior supraciliaries; ear opening circular; light grey to greenish body color; dewlap with a large basal red spot with two orange-yellow stripes and a broad white margin . . . *A. mestrei* p. 497
- Large, elongate, and keeled posterior supraciliaries; ear opening higher than wide; body color brownish to black; dewlap variable — yellow, white, or grey . . . . . *A. homolechis* p. 495

### ACKNOWLEDGMENTS

I am indebted to Dr. Ernest E. Williams of the Museum of Comparative Zoology for having launched me into the study of the Cuban anoline lizards. He has provided stimulating advice as well as doing part of the work in the preparation of this checklist and key.

I would also like to express my appreciation to the many friends in Camaguey and Oriente who contributed their time, interest and enthusiasm to ensure that my field work would be successful. Sr. Ramon Molina was my constant companion and assistant in the field. Without his keen eyes, enthusiasm, and knowledge of nature I would have been unsuccessful in most of the field tasks that I undertook. Sr. Ramon Mousset and his family were invaluable, not only in their hospitality, but also in the innumerable times that they assisted me. Others who should be thanked are: the late Albert Levin, Camilo Lopez and his son Caria of Birama, Pereco Gonzalez Gonzalez and Gerardo Gonzalez of Buey Arriba, H. G. Sorenson, M. A. Martinez Tapia and Juan Lachicot of Santa Cruz del Sur, Urbano Benito Calvo and Julio de Quesada of Camaguey, and Miguel Angel Mousset and his son Federico of the Finca Sta. Teresa.

Field work in Cuba was first done in January of 1952. The American Philosophical Society generously supported my field work in Camaguey during July and August of 1957, and the National Science Foundation supported field trips throughout the island during June-September of 1959, and a short field trip to Camaguey during April 1960.

This article is part of a study of West Indian anoles financed by National Science Foundation Grants No. G-5634 and G-16066.

### LITERATURE CITED

AHL, E.

1924. Neue Reptilien und Batrachier aus dem Zoologischen Museum Berlin. Archiv. Naturgesch., Abt. A, **90**, No. 5: 246-254.

1925. Neue Iguaniden aus dem zoologischen Museum Berlin. Zool. Anz., **62**: 85-88.
- ALAYO DALMAU, P.
1951. Especies herpetologicas halladas in Santiago de Cuba. Bol. Hist. Nat. Soc. "Felipe Poey," **2**: 106-110.
1955. Lista de los reptiles de Cuba. Mimeographed. Univ. de Oriente, Mus. Charles T. Ramsden, Santiago de Cuba. 29 pp.
- ALLEN, E. R. AND W. T. NEILL
1957. The gecko-like habits of *Anolis lucius*, a Cuban anole. Herpetologica, **13**: 246-247.
- BARBOUR, T.
1914. A contribution to the zoogeography of the West Indies, with special reference to amphibians and reptiles. Mem. Mus. Comp. Zool., **44**: 209-346.
1925. A new Cuban *Anolis*. Occ. Pap. Boston Soc. Nat. Hist., **5**: 167-168.
1928. Reptiles from the Bay Islands. Proc. New England Zool. Club, **10**: 55-61.
1929. Another new Cuban *Anolis*. Proc. New England Zool. Club, **11**: 37-38.
1931. A new North American lizard. Copeia: 87-89.
1937. Third list of Antillean reptiles and amphibians. Bull. Mus. Comp. Zool., **82**: 17-166.
- BARBOUR, T. AND C. T. RAMSDEN
1916. A new *Anolis* from Cuba. Proc. Biol. Soc. Washington, **29**: 19-20.
1919. Herpetology of Cuba. Mem. Mus. Comp. Zool., **47**: 71-213.
- BARBOUR, T. AND B. SHREVE
1935. Notes on Cuban anoles. Occ. Pap. Boston Soc. Nat. Hist, **8**: 249-254.
- BOULENGER, G. A.
1885. Catalogue of the lizards in the British Museum. Ed. 2, London, **2**: 1-497.
- COCHRAN, D. M.
1928. A second species of *Deiroptyx* from Cuba. Proc. Biol. Soc. Washington, **41**: 169-170.
- COCTEAU, J. T.
1838. Reptiles y peces. In de la Sagra, Historia, fisica politica y natural de la Isla de Cuba. Paris, **4**: 1-255.
- COLLETTE, B.
1961. Correlation between ecology and morphology in anoline lizards from Havana, Cuba and southern Florida. Bull. Mus. Comp. Zool., **125**: 137-162.
- COOPER, J. E.
1958. Ecological notes on some Cuban lizards. Herpetologica, **14**: 53-54.

COPE, E. D.

1861. Notes and descriptions of anoles. Proc. Acad. Nat. Sci. Philadelphia, 1861: 208-215.  
 1862. Contributions to neotropical saurology. Proc. Acad. Nat. Sci. Philadelphia, 1862: 176-188.  
 1864. Contributions to the herpetology of tropical America. Proc. Acad. Nat. Sci. Philadelphia, 1864: 166-181.

DUELLMAN, W. E. AND A. SCHWARTZ

1958. Amphibians and reptiles of southern Florida. Bull. Florida State Mus., Biol. Sci., **3**: 181-324.

DUMÉRIL, A. M. C. AND G. BIBRON

1837. *Erpétologie générale ou histoire complete des reptiles*. Paris, **4**: 1-571.

DUNN, E. R.

1926. Notes on Cuban anoles. *Copeia*: 153-154.

ETHERIDGE, R.

1959. The relationship of the anoles (Reptilia: Sauria: Iguanidae): An interpretation based on skeletal morphology. Unpublished Ph.D. thesis, Univ. Michigan: 1-240. (Microfilm.)

FITZINGER, L.

1843. *Systema Reptilium. Fasciculus Primus Amblyglossae*. Vienna, vi + 106 pp.

GRAY, J. E.

1840. Catalogue of the species of reptiles collected in Cuba by W. S. MacLeay, Esq. *Ann. Mag. Nat. Hist.*, **5**: 108-115.

GUNDLACH, J.

1880. *Contribucion a la erpetologia cubana*. G. Montiel, Habana, 98 pp.

HALLOWELL, E.

1856. Notes on the reptiles in the collection of the Academy of Natural Sciences of Philadelphia. Proc. Acad. Nat. Sci. Philadelphia, 1856: 221-238.

HARDY, J. D.

1957. Observations on the life history of the Cuban lizard, *Anolis lucius*. *Herpetologica*, **13**: 241-245.  
 1958. Tail prehension and related behavior in a New World lizard. *Herpetologica*, **14**: 205-206.

MERREM, B.

1820. *Tentamen systematis amphibiorum*. Marburg, i-xv + 1-191 pp.

NEILL, W. T. AND R. ALLEN

1957. *Deiroptyx* — Cuba's reptilian oddity. *Nat. Mag.*, **50**: 39-41.  
 1959. Studies on the amphibians and reptiles of British Honduras. *Publ. Res. Div. Ross Allen Rept. Inst.*, **2**: 1-76.

NOBLE, G. K. AND W. G. HASSLER

1935. A new giant *Anolis* from Cuba. *Copeia*: 113-115.

- OLIVER, J.  
1948. The anoline lizards of Bimini, Bahamas. Amer. Mus. Novit., no. 1383: 1-36.  
1950. *Anolis sagrei* in Florida. Copeia: 55-56.
- PETERS, W.  
1863. Über einige neue Arten der Saurier-Gattung *Anolis*. Monatsber. Akad. Wiss. Berlin: 135-149.
- RAND, A. S.  
1961. Ecology, behavior and morphology of anoline lizards in Puerto Rico. Unpublished Ph.D. thesis, Harvard Univ.: 1-135.
- ROSEN, N.  
1911. Contribution to the fauna of the Bahamas. II. The reptiles. Acta Univ. Lundensis, (n. s.) 7: 26-45.
- RUIBAL, R.  
1958. A preliminary investigation of the ecology and taxonomy of Cuban lizards. Year Book Amer. Phil. Soc., 1957: 256-258.  
1961. Thermal relations of five species of tropical lizards. Evolution, 15: 98-111.
- RUIBAL, R. AND E. E. WILLIAMS  
1961a. Two sympatric Cuban anoles of the *carolinensis* group. Bull. Mus. Comp. Zool., 125: 181-208.  
1961b. The taxonomy of the *Anolis homolechis* complex of Cuba. Bull. Mus. Comp. Zool., 125: 211-246.
- SCHWARTZ, A.  
1958. A new subspecies of *Anolis equestris* from eastern Cuba. Herpetologica, 14: 1-7.  
1959. Variation in lizards of the *Lciocephalus cubensis* complex in Cuba and the Isla de Pinos. Bull. Florida State Mus., Biol. Sci., 4: 97-143.
- SCHWARTZ, A. AND L. H. OGREN  
1956. A collection of reptiles and amphibians from Cuba with descriptions of two new forms. Herpetologica, 12: 91-110.
- SHAW, C. E. AND P. L. BREESE  
1951. An addition to the herpetofauna of Hawaii. Herpetologica, 7: 68.
- SMITH, H. M.  
1946. Handbook of lizards. Comstock Publ. Co., Ithaca, 557 pp.
- SMITH, H. M. AND W. L. BURGER  
1949. A new subspecies of *Anolis sagrei* from the Atlantic coast of tropical America. An. Inst. Biol., 20: 407-410.
- SMITH, H. M. AND T. WILLIS, JR.  
1955. Intraspecific variation in compression of tail in a Cuban lizard, *Anolis lucius*. Herpetologica, 11: 86-87.
- STEJNEGER, L.  
1905. Batrachians and land reptiles of the Bahama Islands. In Shattuck, G. B., The Bahama Islands. The Geographical Society of Baltimore, MacMillan Co., New York, pp. 329-343.

WILLIAMS, E. E.

1961. Notes on Hispaniolan herpetology. 3. The evolution and relationships of the *Anolis semilineatus* group. *Breviora, Mus. Comp. Zool.*, no. 136: 1-8.

WILLIAMS, E. E. AND M. HECHT

1955. "Sunglasses" in two anoline lizards from Cuba. *Science*, **122**: 691-692.

WILSON, E. O.

1957. Behavior of the Cuban lizard, *Chamaeleolis chamaeleontides* (Duméril and Bibron) in captivity. *Copeia*: 145.

(Received October 31, 1962)